Claims

1. A thickness shear mode piezoelectric resonator for use in a sensor arrangement for detecting or measuring an analyte in a medium, said resonator comprising a quartz crystal plate (7, 107, 207) having a first crystal surface (8, 108, 208) and a second crystal surface (9, 209), said first crystal surface being provided with a first electrode (10, 110, 210) and said second crystal surface being provided with a second electrode (11, 211), **characterised in** that the first electrode has a surface area of less than 15 mm^2.

2. The resonator of claim 1, wherein the surface area of the first electrode is less than 10 mm^2.

3. The resonator of claims 1 or 2, wherein the surface area of the first electrode is at least 0.05 mm^2, preferably 1-5 mm^2.

4. The resonator of any one of claims 1-3, wherein the surface area of the first electrode is smaller than the first crystal surface, the first electrode preferably having a surface area that is 0.1-90% of the crystal area.

5. The resonator of any one of claims 1-4, wherein the distance from the sensing electrode edge to the crystal edge is at least 0.2 mm, preferably 1 mm and more preferably 2 mm.

6. The resonator of any one of claims 1-5, wherein the first electrode (110) has a surface that has the shape of a rectangle, having a first side (15) and a second side (16).

7. The resonator of any one of claims 1-6, wherein the first side is at least 0.1-10 times the second side.

8. The resonator of any one of claims 1-6, wherein the first crystal surface (8, 108, 208) is provided with a first contacting area (12, 112, 212) connected to the first electrode (10,

110, 210) and the second crystal surface (9, 209) is provided with a second contacting area (13) connected to the second electrode (11, 211, 311).

9. The resonator of claim 8, wherein the first contacting area (12, 112, 212) is connected to the second side (16) of the first electrode.

10. The resonator of any one of claims 1-9, wherein the first and second surfaces (8, 108; 9) of the quartz crystal (7, 107) are flat.

11. The resonator of any one of claims 1-9, wherein the quartz crystal (207) is an inverted mesa, i.e. it has a thin central region in which the first electrode (210) is provided.

12. The resonator of claim 11, wherein the first side of the crystal (207) has at least a first recess (19) in which the first electrode (210) is provided, said first recess (19) having a wall (24) and a bottom surface (21) and the area of the bottom surface being larger than the first electrode (210) and wherein the first electrode is arranged in the recess such that there is a distance between the electrode edges (25) and the recess walls (24).

13. The resonator of claim 11, wherein the shortest distance from the electrode edge (25) to the recess walls (24) is at least 0.01 mm.

14. A flow cell for use in an apparatus for detecting or measuring an analyte in a medium, comprising walls forming a sensing chamber (26) together with a resonator (29) according to any one of claims 1-13, and inlet and outlet openings (27, 28) for leading a fluid through the sensing chamber, **characterised in** that a part of the resonator (29) constitutes one of the walls of the sensing chamber and is arranged such that the first electrode (310, 410) is situated inside the sensing chamber.

15. The flow cell of claim 14, wherein the cross sectional area of the sensing chamber perpendicular to the flow direction is less than 2,5 times the cross sectional area of the inlet and outlet openings.

16. The flow cell of claim 15, wherein the cross sectional area of the sensing chamber perpendicular to the flow direction is the same as the cross sectional area of the inlet and outlet openings.

17. The flow cell of any one of claims 14-16, wherein the sensing chamber has a volume of less than 2 µl.

18. The flow cell of any one of claims 14-17, wherein the flow cell comprises a flow cell element (32) that includes an outwardly open recess (33), having a bottom surface (34) and walls (35), whereby said bottom and walls constitute the walls of the sensing chamber not provided by the resonator (29), and wherein the resonator is a replaceable part, which is held against the flow cell element by a pressing force so as to cover the recess and thus form the flow cell.

19. The flow cell of any one of claims 14-17, wherein flow cell comprises a flow cell element (32) that includes an outwardly open recess (33), having a bottom surface (34) and walls (35), whereby said bottom and walls constitute the walls of the sensing chamber not provided by the resonator (29), and wherein the resonator is attached to the flow cell element by an adhesive so as to cover the recess and thus form the flow cell.

20. The flow cell of claim 18 or 19, wherein the flow cell element comprises a contact surface (36), against which the resonator is to be held, which is plane-parallel to the bottom (34) of the recess (33) and which encircles the recess, and wherein the recess has a geometrical shape that corresponds to the geometry of the first electrode (410).

21. The flow cell of any one of claims 18 -20, wherein the shortest distance from the electrode edge to the recess walls (35) is at least 0.01 mm.

22. A sensor arrangement for detecting or measuring an analyte in a medium, **characterised in** that it comprises a flow cell according to any one of claims 14-20.

23. The use of the thickness shear mode resonator according to any one of claims 1-13 for sensing or measuring purposes.

24. The use of claim 23, wherein the resonator is used for sensing or measuring of liquid samples.